

(S.02)

Integration:-

[1] Definite

[2] Indefinite

$$[III] \int x^n dx = \frac{x^{n+1}}{n+1} + C \quad n \neq -1$$

$$[2] \int (f(x))^n f'(x) dx = \frac{(f(x))^{n+1}}{n+1} + C$$

$$[3] \int e^x dx = e^x + C$$

$$* \int e^{f(x)} \cdot f'(x) dx = e^{f(x)} + C$$

$$[4] \int \frac{1}{x} dx = \ln|x| + C$$

$$* \int \frac{\text{البسط مشتق المقام}}{\text{مقام}} dx = \ln|\text{المقام}| + C$$

$$[5] \int \frac{1}{\sqrt{f(x)}} f'(x) dx = 2\sqrt{f(x)} + C$$

* operation on integration :-

$$\textcircled{1} \int (f(x) \pm g(x)) dx = \int f(x) dx \pm \int g(x) dx$$

$$\textcircled{2} \int c f(x) dx = c \int f(x) dx$$

Exs :-

$$\textcircled{1} \int (2x + x^2) dx = \frac{2x^{1+1}}{1+1} + \frac{x^{2+1}}{2+1} + C$$

$$\textcircled{2} \int 2x (x^2 + 1)^2 dx = \frac{(x^2 + 1)^3}{3} + C$$

$$\textcircled{3} \frac{1}{6} \int e^{3x^2} 6x dx = \frac{1}{6} e^{3x^2} + C$$

$$\textcircled{4} \frac{1}{2} \int \frac{2x}{x^2 + 1} dx = \frac{1}{2} \ln(x^2 + 1) + C$$

$$\int a^x dx = \frac{a^x}{\ln a} + C$$

$$\int e^{ax} dx = \frac{e^{ax}}{a} + C$$

$$\int a^{bx} dx = \frac{a^{bx}}{b \ln a} + C$$

$$\int \sin x \, dx = -\cos x + C$$

$$\int \cos x \, dx = \sin x + C$$

$$\int \sin(f(x)) \cdot f'(x) \, dx = -\cos(f(x)) + C$$

$$\int \cos(f(x)) \cdot f'(x) \, dx = \sin(f(x)) + C$$

